The University of Chicago
Department of Statistics

Master's Seminar

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Fitting and Testing a Semiparametric Generalized Linear Model Against Alternative Models

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ABSTRACT

In this paper, we introduce a Semiparametric Generalized Linear Model (SPGLM), in which the distribution of response Y is constructed as an exponential tilt of a baseline distribution f_0 determined by a regression model for the mean. Computing algorithms are developed for this semiparametric model to obtain ML estimates of both regression parameters beta and f_0. The algorithms were applied to ordinal response and count data with finite support. A direct comparison of our SPGLM with two alternative models, the Poisson log-linear (PLLM) and the Proportional Odds Model (POM), is done by fitting them to simulated data as well as to two real data sets. Simulations show that SPGLM yields consistent estimates of coefficients, and is more efficient and accurate than the PLLM and POM when the data are generated via the SPGLM. In particular, SPGLM substantially outperforms the PLLM when the response distribution greatly deviates from Poisson (e.g. a zero-inflated Poisson). Data analysis results show that the SPGLM is a reasonable competitor to the POM in terms of fitting the data.

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